

ABSTRACT

LOGISTIC SMOOTH TRANSITION AUTOREGRESSIVE (LSTAR) MODELING WITH NONLINEAR LEAST SQUARE (NLS) METHOD TO FORECAST INFLATION RATE IN INDONESIA

By

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A time series is a series of observational data taken and organized in the same time interval. In some cases time series require nonlinear modeling. LSTAR is one of the time series methods that can be used for nonlinear time series modeling. In this study, the LSTAR method is applied to forecast the inflation rate in Indonesia using the Nonlinear Least Square estimation method. Model building is done on inflation data by using lag $p=1$ and lag $p=13$. Based on the analysis results, the LSTAR(13,1) model is obtained, as following:

$$\begin{aligned}\hat{Y}_t = & 2.9863928 - 0.1763146Y_{t-1} + 0.1477540Y_{t-2} + 0.0790596Y_{t-3} - \\ & 0.1949471Y_{t-4} - 0.3023761Y_{t-5} - 0.1904588Y_{t-6} + 0.1639410Y_{t-7} - \\ & 0.0251816Y_{t-8} - 0.0022138Y_{t-9} + 0.0585488 Y_{t-10} + 0.0275204Y_{t-11} + \\ & 0.6712446Y_{t-12} \left(1 - \frac{1}{1+e^{-100(Y_{t-1}-0.0117484)}} \right) - 10.118217 \left(\frac{1}{1+e^{-100(Y_{t-1}-0.0117484)}} \right)\end{aligned}$$

The results of modeling the value of inflation in Indonesia are close to the original data as indicated by a fairly good Mean Absolute Percentage Error (MAPE) value of 10.7%.

Kata Kunci: Forecasting, Nonlinear Least Square, Logistic Smooth Transition Autoregressive, Mean Absolute Percentage Error.

ABSTRAK

PEMODELAN *LOGISTIC SMOOTH TRANSITION AUTOREGRESSIVE* (LSTAR) DENGAN METODE *NONLINEAR LEAST SQUARE* (NLS) UNTUK MERAMALKAN TINGKAT INFLASI DI INDONESIA

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Deret waktu merupakan serangkaian data pengamatan yang diambil serta disusun dalam interval waktu yang sama. Dalam beberapa kasus deret waktu diperlukan pemodelan yang bersifat nonlinear. LSTAR adalah salah satu metode deret waktu yang dapat digunakan untuk pemodelan deret waktu nonlinear. Dalam penelitian ini metode LSTAR diterapkan untuk meramalkan tingkat inflasi di Indonesia dengan menggunakan metode estimasi *Nonlinear Least Square*. Pembentukan model dilakukan terhadap data inflasi dengan menggunakan lag $p=1$ dan lag $p=13$. Berdasarkan hasil analisis diperoleh model LSTAR(13,1) sebagai berikut:

$$\begin{aligned} \hat{Y}_t = & 2.9863928 - 0.1763146Y_{t-1} + 0.1477540Y_{t-2} + 0.0790596Y_{t-3} - \\ & 0.1949471Y_{t-4} - 0.3023761Y_{t-5} - 0.1904588Y_{t-6} + 0.1639410Y_{t-7} - \\ & 0.0251816Y_{t-8} - 0.0022138Y_{t-9} + 0.0585488Y_{t-10} + 0.0275204Y_{t-11} + \\ & 0.6712446Y_{t-12} \left(1 - \frac{1}{1+e^{-100(Y_{t-1}-0.0117484)}} \right) - 10.118217 \left(\frac{1}{1+e^{-100(Y_{t-1}-0.0117484)}} \right) \end{aligned}$$

Hasil pemodelan nilai inflasi di Indonesia mendekati data aslinya yang ditunjukkan dengan nilai *Mean Absolute Percentage Error* (MAPE) yang cukup baik yaitu 10,7%.

Kata Kunci: Peramalan, *Nonlinear Least Square*, *Logistic Smooth Transition Autoregressive*, *Mean Absolute Percentage Error*.